



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/807,472

03/24/2004

Osamu Nakamura

740756-2722

2927

22204

7590

12/22/2009

NIXON PEABODY, LLP

401 9TH STREET, NW

SUITE 900

WASHINGTON, DC 20004-2128

EXAMINER

DHINGRA, RAKESH KUMAR

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

12/22/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/807,472	<b>Applicant(s)</b> NAKAMURA, OSAMU	
	<b>Examiner</b> RAKESH DHINGRA	<b>Art Unit</b> 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 25 August 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-4, 10-31, 33-38 and 40-56 is/are pending in the application.
- 4a) Of the above claim(s) 24-31, 33-38, 40-44, 48-50 and 54-56 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 10-23, 45-47 and 51-53 is/are rejected.
- 7) ☒ Claim(s) 2,3 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 2/14/06 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Objections***

Claims 2, 3 are objected to because of the following informalities:

Claims 2, 3 recite the object to be treated as “object” in line 10, and also as “substrate”, in line 12.

Appropriate correction is required to use either “object” or “substrate” in these claims.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-4, 1—23, 45-47 and 51-53 have been considered but are moot in view of the new ground(s) of rejection as explained hereunder.

Applicant has amended claims 1-3 by adding new limitations, e.g. in claim 1 new limitations like “wherein the plasma generation unit is moved in an X direction and a Y direction” “only” have been added.

Claims 1-4, 10-31, 33-38 and 40-56 are now pending out of which claims 1-4, 10-23, 45-47 and 51-53 are active.

Reference by Takuya (JP 2002-320845) when combined with Gianchandani et al and Satoshi (JP 2003-059909) reads on limitations of amended claims 1-3 including the newly added limitations. Accordingly claims 1-4, 10-23, 45-47 and 51-53 have been rejected under 35 USC 103 (a) as explained below. Regarding applicant's argument that Satoshi fails to disclose the claimed feature of first electrode and second electrode being arranged in a plane perpendicular to a plane in which a subject substrate is disposed, examiner responds that Fig. 2 of Satoshi depicts first electrode 4 and second electrodes 2, 3 disposed in a plane perpendicular to a plane in which substrate 10 is disposed (since vertical axes passing through center of electrodes 2, 3 and the

electrode 4 are perpendicular to the plane of the substrate 10 {examiner notes that claim does not recite that the surfaces of first and second electrodes between which plasma is generated are arranged perpendicular to a plane in which a substrate to be processed is disposed}.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 1-4, 10-23, 45-47 and 51-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gianchandani et al (WO 01/27969, which is equivalent to US 6,827,870, and referred to hereinafter) in view of Satoshi (JP 2003-059909) and Takuya (JP 2002-320845).**

Regarding Claim 1: Gianchandani et al teach a plasma apparatus comprising:  
a plasma generation unit comprising a substrate 17 (as a first electrode) and a plurality of electrode elements 51, 52 opposed to the first electrode 17; and  
a gas supply unit 13 for blowing (introducing) a process gas into a space between the first electrode 17 and the plurality of second electrodes 51, 52 such that a plurality of micro plasma with independent control can be generated {the plasma is generated between the electrode segments and the substrate 17 due to dissociation of gas blown in these openings and by the voltage applied from a power supply}. Gianchandani et al also teach that ingress of gas in the

Art Unit: 1792

openings 24 (space between first and second electrodes 26, 17) can be obtained through laterally extending micro-channels (not shown) in the dielectric layer 22 [that is gas is blown in a space between the first electrode and the plurality of second electrodes]; and.

a power supply unit 31 for applying a voltage independently (selectively) to at least one electrode among the plurality of second electrodes 51 and 52, wherein the plurality of second electrodes 51, 52 of the plasma generation unit are arranged linearly in one line. Gianchandani et al also teach a holder 54 that enables movement of plasma generator with respect to surface of the substrate to provide a selected etch pattern in the underlying substrate (e.g. Fig. 1-3 and col. 2, lines 40-65 and col. 5, line 25 to col. 7, line 35).

Gianchandani et al does not explicitly the plasma generation unit is moved in an X direction and a Y direction. And that the electrical unit is adapted to selectively apply a voltage to a selected electrode among the plurality of second electrodes.

Satoshi teach a plasma treatment apparatus comprising:

a plasma generation unit comprising a first electrode 4 and a plurality of second electrodes 2, 3 opposed to the first electrode 4;

a gas supply unit adapted to blow a process gas into a space between the first electrode 4 and the plurality of second electrodes 2, 3; and

a unit comprising a power supply 1 and switches 5, 6 adapted to selectively apply a voltage to a selected electrode among the plurality of second electrodes 2, 3,

wherein the plurality of second electrodes 2, 3 are arranged linearly in one line, and the first electrode 4 and the second electrodes 2, 3 are arranged perpendicular to the substrate 10 (the vertical axes of the electrodes 2,3 and 4 are perpendicular to the substrate 10 – examiner notes that claim does not recite that the surfaces of first and second electrodes between which plasma

Art Unit: 1792

is generated are arranged perpendicular to a plane in which a substrate to be processed is disposed {e.g. Fig. 2 and para. 0015, 0016} [claim limitation “selectively apply a voltage to a selected electrode among the plurality of second electrodes”, is interpreted to imply that a voltage can be applied selectively to any one or even both the electrodes among the plurality of second electrodes].

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide an electrical unit that is adapted to selectively apply a voltage to a selected electrode among the plurality of second electrodes as taught by Satoh in the apparatus of Gianchandani et al to provide flexibility for controlling plasma processing over the substrate surface.

Gianchandani et al in view of Satoh teach a moving mechanism 54 for electrodes 51, 52 (Gianchandani et al – Fig. 3) but do not explicitly the plasma generation unit is moved in an X direction and a Y direction.

However it is known in the art to move the plasma generation unit in X and Y directions to enable scan and process a specific portion of the substrate.

Takuya teaches a plasma apparatus comprising a plasma generator including a first electrode 3, a plurality of second electrodes 2, 2' for processing a substrate 10. Yara et al further teach that electrode 3 (plasma generation unit) is connected to a X-Y-Z moving mechanism to enable process a specific part/portion of the substrate (e.g. Fig. 5 and para. 0023-0034).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention provide the plasma generation unit as movable in X and Y directions as taught by Takuya in the apparatus of Gianchandani et al in view of Satoshi to enable process a specific part/portion of the substrate.

Regarding Claims 2, 3: Gianchandani et al in view of Satoshi and Takuya teach all limitations of the claim (as already explained above under claim 1) and including the first electrode and the plurality of second electrodes are arranged perpendicular to a plane in which a substrate is disposed (e.g. Gianchandani et al – Figs. 7, 8 – first electrode 26 and plurality of second electrodes 72 are arranged perpendicular to a plane in which a substrate 17 is disposed, and Satoshi – Fig. 2 – first electrode 4 and plurality of second electrodes 2, 3 are arranged perpendicular to a plane in which a substrate 10 is disposed) {examiner notes that claim does not recite that the surfaces of first and second electrodes between which plasma is generated are arranged perpendicular to a plane in which a substrate to be processed is disposed}. Further, Gianchandani et al also teach that size of opening 72 (equivalent to a second electrode, since plasma passes through this opening to etch the surface 21 of the substrate 17. Gianchandani et al also teach that etch rate varies with the size of the opening 72. It would be obvious to optimize the size of second electrode (as a result effective variable) as per process limitations like etch rate. Further, it would also be obvious to optimize the size of second electrode depending upon the type of etching application required (e.g. Gianchandani et al - Figs. 5- 8 and col. 11, line 65 to col. 12, line 31).

Regarding Claim 4: Gianchandani et al in view of Satoshi teach all limitations of the claim except pattern is a wiring pattern, which is an intended use. Since the prior art apparatus meets all structural limitations of the claim, the apparatus is considered capable of meeting this intended use limitation.

In this connection courts have ruled:

A claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

Regarding Claims 10-12: Gianchandani et al teach that plurality of second electrodes are formed using lithography techniques (Fig. 5 and col. 10, lines 15-25).

Regarding Claims 13-15: Gianchandani et al teach first electrode 17 and plurality of second electrodes 51, 52 are covered with dielectric 22 (Fig. 1).

Regarding Claims 16, 17: Gianchandani et al teach the apparatus is used for etching or deposition (col. 2, lines 50-60).

Regarding Claims 18, 22, 23: Gianchandani et al teach that typical operating pressure can range from 1-1000 torr (as against claimed pressure of 1 atm = 760 torr). It would be obvious to select operating pressure as other process limitations like gases, material to be etched /deposited and voltages etc (col. 8, lines 5-15).

Regarding Claims 19-21: Gianchandani et al teach all limitations of the claim including moving of holder 54 for relative motion between substrate 17 (stage) and the at least one electrode 51, 52 and synchronizing the movement with application of voltage to at least on electrode (can be pre-determined electrode since voltage can be supplied independently to various electrodes) [col. 2, line 40 to col. 3, line 20 and col. 6, line 60 to col. 7, line 35].

Regarding Claims 45-47: Satoshi teaches the blown process gas acts on the substrate 10 (Fig. 2).

Regarding Claims 51-53: Gianchandani et al in view of Satoshi and Takuya teach all limitations of the claim including movable electrodes 51, 52 (through holder 54) that enable moving the electrodes with respect to substrate to provide selective plasma processing on the substrate surface (Gianchandani et al – Fig. 3). Further, in view of teaching of Takuya regarding lower electrode 3 being movable in X, Y and Z directions, it would be obvious to provide X, Y



movement in the apparatus of Gianchandani et al in view of Satoshi and Takuya to obtain selective processing of substrate at any location on the substrate.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RAKESH DHINGRA whose telephone number is (571)272-5959. The examiner can normally be reached on 8:30 - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1792

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/R. D./  
Examiner, Art Unit 1792

/Karla Moore/  
Primary Examiner, Art Unit 1792